stage kidney disease on the affected diseased kidney. One patient was pre-renal transplant and had both kidneys treated. One week after cystoscopy aided transurethral treatment with the NephroBlate™ device, the previously planned nephrectomy was performed. Following this we treated 4 resistant hypertensive patients.
Results: Nephrectomy Patients – Procedure time was between 9 to 15 min., and no adverse effects were recorded. The histopathological results of the treated kidney in all cases showed a significant destruction of the peri-pelvic nerves from the renal pelvic space to the serosa (1.75mm). We then proceeded with our clinical studies on resistant hypertensive patients. Resistant Hypertensive Patients – Four patients were treated utilizing a standard urologic procedure with OR times of 16-25 min. Within 30 seconds of treatment of the first kidney, a blood pressure response was noted (reduction of mean systolic blood pressure 44mmHg, reduction of mean diastolic blood pressure 13mmHg). Following the procedure, none of the patients had significant pain or bleeding.
Conclusions: At six month follow-up, the patients continue to be normotensive with no renal issues. The blood pressure response was immediate and occurred while the patients were under general anesthesia. In this small series of humans treated with limited follow-up, we see a promising nonvascular alternative for renal denervation for treatment for resistant.

TCT-410

Evaluation of the Acute and Long Term Renal Artery Re-Innervation Attempt Response Following Radiofrequency Catheter-Based Renal Nerve Ablation in a Swine Model: A Immunohistochemical Characterization

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Background: Catheter-based renal denervation (RDN) has demonstrated efficacy in controlling blood pressure in clinical trials. The long-term effect in blood pressure and nerve "regrowth" has been questioned. We aimed to study and characterize the renal nerve response following RDN acutely and long term.
Methods: Swine underwent bilateral RDN and they were followed for 7, 30, 90 and 180 days. At each time point renal arteries were harvested for further histological analysis. A representative section of each time point was selected for regular H&E staining and immunohistochemical (IHC) analysis. The IHC evaluation of the renal arteries consisted on S100 (Schwann cell), Tyrosine hydroxylase (TH; efferent motor renal nerves), calcitonin gene-related peptide (CGRP) and substance P (SP); (CGRP and SP afferent sensory renal nerves) to provide a complete characterization of the nerve response to treatment over time.
Results: H&E stain displayed a nerve injury in acute (7 days: nerve necrosis, distal atrophy) and chronic follow up (180 days: nerve fibrosis). At the longer time points H&E displayed nerve remodeling and tentative regeneration. At chronic time points there was morphological recovery of S100, TH, CGRP and SP. However, there was evidence of TH and S100 staining and extension of neural bundles within and across the thickened perineurium, forming neurofibrous tangles (perineural neuromatous regeneration, PNR). IHC revealed TH and S100 positive fibers within and beyond the fibrous perineurium as early as 7 days post-RDN. This PNR becomes more evident at longer time points. At 180 days, these neuromatous tangles became very prominent to the point of being evident with HE where affected nerves were sometimes completely remodeled into neuromatous proliferative bundles.
Conclusions: Nerves regeneration has been demonstrated in renal transplant models. Long term follow up has demonstrated nerve count increase following RDN in pre-clinical studies. We demonstrate that this "regenerative nerve attempt" occurs as early as 7 days post-RDN resulting in a poorly organized tangles of nerve fibers and connective tissue. This is the first complete histological characterization of neuromatous nerve regrowth following RDN.

TCT-411

Abstract Withdrawn

TCT-412

Non-invasive Renal Denervation Using Externally Delivered Focused Ultrasound: Early Experience Using Doppler based Imaging Tracking and Targeting for Treatment

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Background: The Kona Medical Surround Sound™ System is a noninvasive treatment for renal denervation and delivers externally focused ultrasound to the renal nerves using Doppler based ultrasound image guidance to track and correct for renal artery motion during treatment.
Methods: Twenty-three patients with severe treatment resistant hypertension, defined as persistent systolic blood pressure (SBP) greater than 160 mmHg despite three or more antihypertensive medications, were treated non-invasively with the Kona Medical Surround Sound System™ to evaluate the safety and feasibility of a novel approach to this treatment for renal denervation. Focused ultrasound energy was delivered to the proximal renal arteries and surrounding tissue using non-invasive Doppler-based imaging and continuous tracking with automatic correction for kidney motion throughout treatment. All patients received conscious sedation during treatment and tolerated treatment well.
Results: Fourteen patients completed at least the 6-Week Follow-up Visit, and three subjects completed the 24-Week Follow-up Visit. No serious device related events have been reported during treatment or during the initial three week follow-up period. Six patients reported mild, clinically insignificant back pain immediately following treatment with complete resolution within 24 hours in a majority of patients. One patient developed post-procedural transient hypokalemia, probably unrelated to renal denervation, which resolved with potassium replacement. Of the 14 patients who have completed 6-Week Follow-up Visits, 11 (78.6%) achieved a systolic blood pressure (SBP) decrease of at least 10 mmHg, with an average SBP decrease of 23 mmHg and an average diastolic blood pressure decrease of 9 mmHg.
Conclusions: Initial results of this fully non-invasive renal denervation system demonstrated it was well tolerated and safely delivered in 23 patients. Doppler-based image guidance for targeting and continuous tracking with automatic motion correction enabled patients to benefit from renal denervation therapy without the invasive risks associated with catheter based renal denervation.

TCT-413

Intra-luminal ultrasound renal denervation effectively reduces sympathetic nerve activity; a translational comparison of preclinical and clinical data

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Background: The Paradise® Renal Denervation System (ReCor Medical, Palo Alto, CA) is designed to deliver ultrasound (US) energy to perform circumferential denervation of the renal sympathetic nerves. As current renal denervation systems do not allow for immediate biofeedback to the user regarding effective denervation, it is critical to generate mechanism of action data. We demonstrate in a preclinical model and in humans that US denervation decreases sympathetic nerve activity post procedure, which should to translate into potential clinical benefit in humans.
Methods: Bilateral ultrasound renal denervation was performed in 8 normotensive pigs. Pigs received 1, 2, or 3 bilateral US emissions. At 7 days, kidney norepinephrine (NEPI) levels were measured by HPLC/MS to assess sympathetic nerve activity, and renal nerve injury was assessed histologically. MSNA data was collected at baseline and one month post procedure in 5 patients enrolled in the REALISE trial in France. Patients received 2 or 3 bilateral US emissions. Office BP was recorded at 1 month and correlations between BP and MSNA reduction performed.
Results: Kidney NEPI levels were significantly reduced in all animals and correlated with the degree of nerve damage. 2 or 3 bilateral ultrasound emissions resulted in 89% or 97% NEPI reduction, respectively. A reduction in NEPI $\geq$89% correlated with ablation of 76% of nerves along the length of the renal artery. In humans, a reduction in MSNA was observed in all 5 patients (mean 17%) 1 month following US denervation. The decrease in MSNA correlated with a decrease in BP $\geq$10mmHg in 4 of 5 patients suggesting that US is effective in reducing sympathetic nerve activity, which may translate into clinical benefit in a subset of patients.
Conclusions: Translational data is critical towards understanding the mechanism of action associated with renal denervation devices. Ultrasound renal denervation effectively and consistently reduced sympathetic activity acutely in a preclinical model and in a small subset of patients providing evidence that the technology is performing as intended in vivo.

TCT-414

Obesity Is Associated With A Less Pronounced Treatment Response After Renal Denervation

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Background: Catheter-based renal denervation (RDN) causes significant blood pressure (BP) reductions in patients with resistant hypertension. The purpose of this study was to identify predictors of BP response.
Methods: This is a single-center, non-randomized, uncontrolled retrospective analysis of hypertensive patients. One hundred one consecutive patients with resistant hypertension who underwent RDN with the Symplicity™ catheter were included. Uni- and multivariate logistic regression analyses were performed to detect baseline predictors of a significant BP response 6 months after RDN (age, gender, office and ambulatory BP, renal function, body mass index [BMI], diabetes mellitus, antihypertensive medication, number of ablations). Primary endpoint was the change in average office BP at 6-month follow-up compared to baseline and between groups.
Results: The patients included in this study were 61 males and 40 females, with a median age of 62.8 $\pm$ 11.0 years. The procedure was technically uneventful in all patients. Mean BP at baseline was 166.6/90.2 $\pm$ 22.5/16.4 mmHg and decreased by -14.7 ($p< 0.0001$) /-5.3 ($p< 0.001$) $\pm$ 22.8/14.1 mmHg at 6-month follow-up. Similarly, paired analysis of 24 hour-ambulatory blood pressure measurement (n=71) showed a significant reduction of mean systolic BP by 6.8 $\pm$ 14.4 mmHg ($p< 0.0002$).